PROJECT MANAGEMENT PLAN:

TEMPLE STEEPLE FOR THE CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS

RVHB ENGINEERING

GUILLERMO BUSTAMANTE

STEVE HALL

CURTIS RASMUSSEN

ZAC VIDMAR

CONTENTS

General Information 3

Vision Statement 3

Purpose 3

Objective 3

Scope 3

Major Client, Mentor and General Information 4

Project Sponsor 4

Project Mentor / Manager 4

Professors 4

Organizational Structure 4

Scope of Work Summary 5

Project Schedule / responsibility Matrix / Timeline 6

Project Budget 7

Communication Plan 8

GENERAL INFORMATION

VISION STATEMENT

RVHB Engineering is dedicated to providing safe, reliable, sustainable, and innovative solutions to modern engineering problems. We commit to providing cost-effective designs tailored to client's individual needs. RVHB Engineering employs four qualified engineers in training who are committed to providing quality work in a timely manner.

PURPOSE

The Church of Jesus Christ of Latter-day Saints has over 14 million members worldwide. Temples are an important part in the worship services of these members and must be accessible to patrons in various locations throughout the world. In this circumstance, the temple must be designed to perform under the local seismic loads. The purpose of this project is to provide these members with a sustainable temple structure.

OBJECTIVE

Understanding the effect of earthquakes on structural systems is crucial when designing structures in areas with high seismic activity. The Church of Jesus Christ of Latter-day Saints has decided to build a temple in one of these areas. By nature temples must be designed to endure gravity and horizontal loads due to ground motion while maintaining an aesthetic architecture. The steeple of one of these temples must be designed to meet seismic performance criteria at an optimal cost. The steeple must also fit the current architectural constraints

SCOPE

A comparison between different seismic designs fitting current architectural requirements will be performed. Architectural constraints that will be used in analysis are exterior cladding, window placement and the statue of angel Moroni. After preliminary consideration, three structural framing systems will be considered in the design. Two types of system designs will be taken into consideration. A two-stage approach will be conducted in accordance with ASCE 7-10 Section 12.2.3.2. A component design in accordance with ASCS 7-10 Section 13 will also be conducted.

Each system will be analyzed under a Maximum Considered Earthquake (MCE) and under the Design Basis Earthquake (2/3 MCE). The Response Modification Factors (R) for each system will be determined. Each design will be modeled in Revit Structure and analyzed using RAM structural analysis software. A cost analysis will also be conducted using Autodesk Quantity Takeoff along with Microsoft Excel. Cost for materials, labor, and construction equipment will be included in the cost analysis.

MAJOR CLIENT, MENTOR AND GENERAL INFORMATION

PROJECT SPONSOR

Brent Maxfield, PE
Civil/Structural Engineer, Special Projects Department
50 East North Temple, 10th Floor, Salt Lake City, UT 84150-6310
801-240-1529 Office, 801-879-1153 Mobile
MaxfieldBA@ldschurch.org

PROJECT MENTOR / MANAGER

Jacob Ballard
Project Mentor
(801)368-4440 Mobile
blardjr@gmail.com

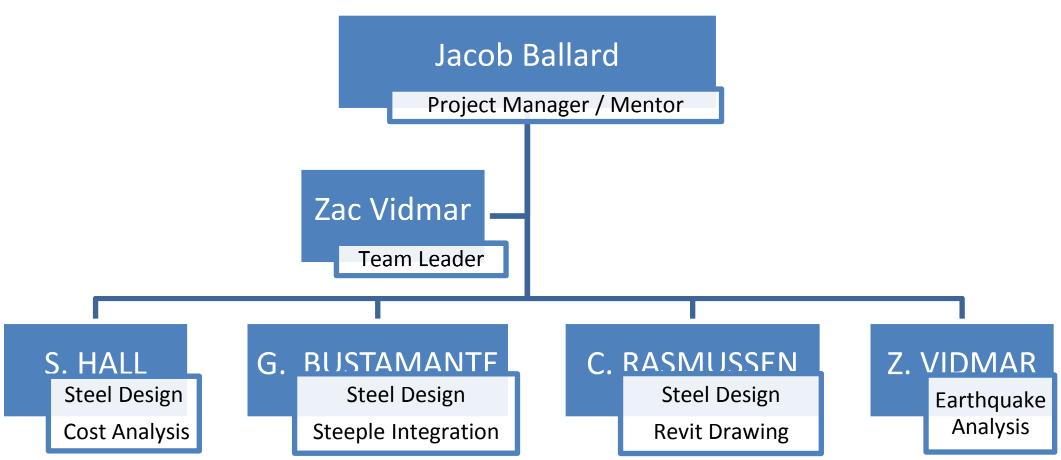
PROFESSORS

Richard J. Balling
Professor of Structures & Optimization
Brigham Young University
(801) 422-2648 Office
balling@byu.edu

Fernando S. Fonseca
Associate Professor of Structural Engineering
Brigham Young University
(801) 422-6329 Office
ffonseca@et.byu.edu

Paul Richards
Assistant Professor of Structural Mechanics
(801) 422-6333 Office
prichards@et.byu.edu

ORGANIZATIONAL STRUCTURE



SCOPE OF WORK SUMMARY

Having experience in structural vibrations with earthquake applications, Zac will be in charge of directing the seismic aspects of the steeple design. He will collaborate with Steve, Guillermo, and Curtis who have experience in structural steel design. Guillermo will be responsible for any aspects of the design which involve integrating the steel frame of the steeple with the rest of the structure. Curtis will utilize RAM structural analysis software to analyze and optimize the design. Curtis and Steve will work together to create a structural model in Revit from the provided architectural information. All team members are experienced with AutoCAD and will all assist in creating detailed drawings of the completed design. All team members are also experienced with Mathcad and will collaborate on all calculations. Steve will lead the cost analysis of each design. All members of the team will be expected to continually review one another's work to ensure accuracy in design computations and drawings.

RVHB engineering will utilize data provided by the LDS church. This data will include an architectural profile of the steeple as well as the properties of a generic temple structure. Ground accelerations at the temple location will also need to be provided. RVHB engineering will utilize its resources to the following software: AutoCAD, Autodesk Quantity Takeoff, Microsoft Excel, Mathcad, Revit Structure, and RAM. Site visits will also be conducted to further educate the team on the design of temple steeples.

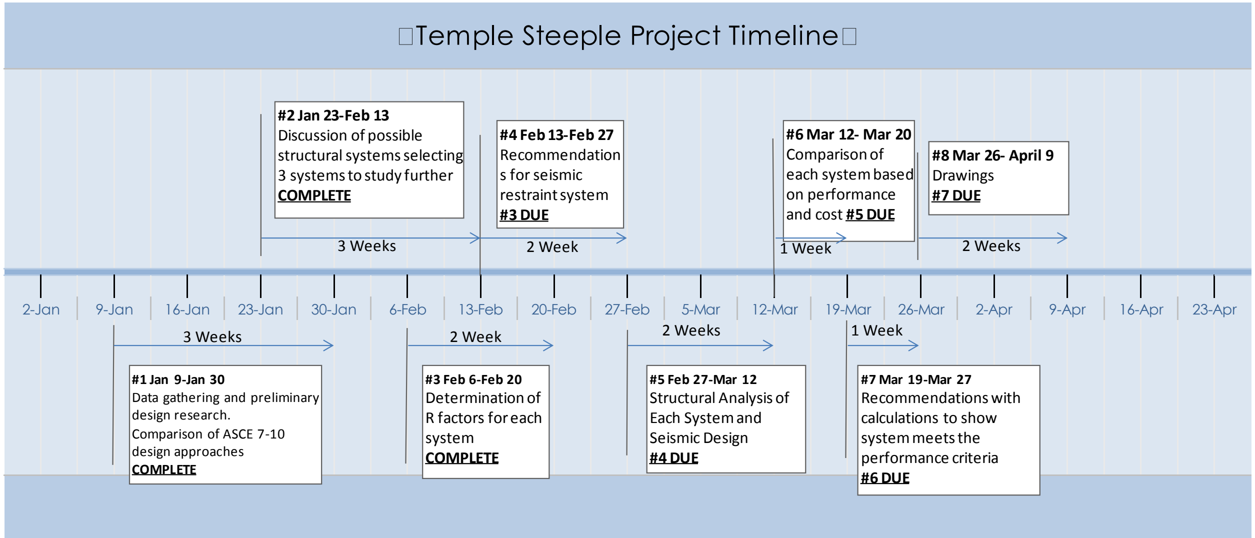
A comparison between different seismic designs fitting current architectural requirements will be performed. Architectural constraints that will be used in analysis are exterior cladding, window placement and the statue of angel Moroni. After preliminary consideration, three structural framing systems will be considered in the design. Two types of system designs will be taken into consideration. A two-stage approach will be conducted in accordance with ASCE 7-10 Section 12.2.3.2. A component design in accordance with ASCS 7-10 Section 13 will also be conducted.

Each system will be analyzed under a Maximum Considered Earthquake (MCE) and under the Design Basis Earthquake (2/3 MCE). The Response Modification Factors (R) for each system will be determined. Each design will be modeled in Revit Structure and analyzed using RAM structural analysis software. A cost analysis will also be conducted using Autodesk Quantity Takeoff along with Microsoft Excel. Cost for materials, labor, and construction equipment will be included in the cost analysis.

PROJECT SCHEDULE / RESPONSIBILITY MATRIX / TIMELINE

Weekly Assignment Schedule

	GUILLERMO BUSTAMANTE	STEVE HALL	CURTIS RASMUSSEN	ZAC VIDMAR	GROUP WORK
9-Jan	RESEARCH PROJECT MATERIALS AND SPECIFATIONS	RESEARCH PROJECT MATERIALS AND SPECIFATIONS	RESEARCH PROJECT MATERIALS AND SPECIFATIONS	RESEARCH PROJECT MATERIALS AND SPECIFATIONS	DISCUSSION OF MATERIALS AND SPECIFATIONS
16-Jan	RESEARCH AISC DESIGN APPROACHES	RESEARCH AISC DESIGN APPROACHES	RESEARCH AISC DESIGN APPROACHES	RESEARCH AISC DESIGN APPROACHES	DISCUSSION OF DESIGN APPROACHES
23-Jan	FURTHER DEVELOPMENT OF DESIGN 1	FURTHER DEVELOPMENT OF DESIGN 2	SET UP REVIT MODEL USING ARCHITECTURAL DRAWING	FURTHER DEVELOPMENT OF DESIGN 3	BRAINSTORM 3 PRELIMINARY DESIGNS
30-Jan	MF	BRBF	Mess around with RAM	ELF/SCBF	3 DESIGN RAM
6-Feb	FINISH DESIGN 1	FINISH DESIGN 2	MODELLING OF DESIGNS IN REVIT	BEGIN DETERMINING R VALUES FOR ALL 3 DESIGNS	3 DESIGN RAM
13-Feb	COST ANALYSIS DESIGN 1	COST ANALYSIS DESIGN 2	MODELLING OF DESIGNS IN REVIT	DETERMINE R VALUES FOR ALL 3 DESIGNS	DISCUSS 3 DESIGNS
20-Feb	STRUCTURAL ANALYSIS OF DESIGN 1	STRUCTURAL ANALYSIS OF DESIGN 2	RAM STRUCTURAL ANALYSIS	STRUCTURAL ANALYSIS OF DESIGN 1	STRUCTURAL ANALYSIS
27-Feb	STRUCTURAL ANALYSIS OF DESIGN 1	STRUCTURAL ANALYSIS OF DESIGN 2	RAM STRUCTURAL ANALYSIS	STRUCTURAL ANALYSIS OF DESIGN 2	STRUCTURAL ANALYSIS
5-Mar	SCBF Design	SCBF Design	SAP STRUCTURAL ANALYSIS	SCBF Design	COMPARE COST/ PERFORMANCE OF DESIGNS
12-Mar	BRBF DESIGN	BRBF DESIGN	MF Design	MF Design	Finalize Designs
19-Mar	RECOMMEND-ATIONS WITH CALCULATIONS	RECOMMEND-ATIONS WITH CALCULATIONS	RECOMMEND-ATIONS WITH CALCULATIONS	RECOMMEND-ATIONS WITH CALCULATIONS	RECOMMEND-ATIONS WITH CALCULATIONS
26-Mar	COMPLETE FINAL DRAWINGS OF DESIGN 1	COMPLETE FINAL DRAWINGS OF DESIGN 2	COMPLETE FINAL DRAWINGS OF DESIGN	COMPLETE FINAL DRAWINGS OF DESIGN 3	COMPLETE FINAL DRAWINGS OF DESIGN
2-Apr	COMPLETE FINAL DRAWINGS OF DESIGN 1	COMPLETE FINAL DRAWINGS OF DESIGN 2	COMPLETE FINAL DRAWINGS OF DESIGN	COMPLETE FINAL DRAWINGS OF DESIGN 3	COMPLETE FINAL DRAWINGS OF DESIGN
9-Apr	FINALIZE PROJECT AND SUBMIT	FINALIZE PROJECT AND SUBMIT	FINALIZE PROJECT AND SUBMIT	FINALIZE PROJECT AND SUBMIT	FINALIZE PROJECT AND SUBMIT



PROJECT BUDGET

Temple Steeple Project Budget

	Work Weeks		14
	Hours/person-week		6
Seismic Design Engineer	Zac	$	29.00
Graphics and Optimization	Curtis	$	27.00
Design Engineer	Guillermo	$	27.00
Business and Innovation	Steve	$	29.00
	Total Hourly Rate	$	112.00
	Total Project	**$**	**9,408.00**

COMMUNICATION PLAN

Weekly meetings will be held every Monday from 4:00 pm to 7:00 pm in room 270 of the Fletcher Building. In these meetings the assignments will be distributed among team members. Each member will work an additional three hours throughout the week to complete their assignments. Individual and team hours worked will be reports during the group meetings. This schedule is outlined in Figure 1. A detailed weekly assignment schedule is shown in Figure 2. These deadlines will be adjusted if indicated by the project sponsor as more information is acquired.

WEEKLY WORK SCHEDULE

HOURS	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
3:00 PM					
4:00 PM		Zac		Steve	
5:00 PM	Group Work				
6:00 PM					Curtis
7:00 PM			Guillermo		
8:00 PM					